

## Claims

1. A method for protecting a tuyere assembly (12) and a refractory lining of a furnace against damage caused by expansion of the refractory lining comprising the step of:  
providing a clearance (40) between said tuyere assembly (12) and a  
5 refractory lining portion (16) below said tuyere assembly (12)  
**characterized by**  
monitoring said clearance (40) by means of a displacement sensor (50).
2. The method as claimed in claim 1 further comprising:  
providing at least one removable refractory layer (72,74; 72') below said  
10 tuyere assembly (12); and  
removing said at least one removable refractory layer (72,74; 72') if the  
height of said clearance (40) is less than a predetermined value.
3. The method as claimed in claim 1 or 2 further comprising:  
sealing said clearance (40) with a compressible sealing material (80).
- 15 4. The method as claimed in any one of the preceding claims, further  
comprising:  
continuously monitoring said clearance (40) during operation of said  
furnace.
- 20 5. The method as claimed in any one of the preceding claims, further  
comprising:  
monitoring said clearance (40) during shutdown of said furnace thereby  
determining contraction behaviour of said refractory lining portion (16)  
below said tuyere assembly (12).
- 25 6. The method as claimed in any one of the preceding claims, further  
comprising:  
monitoring said clearance (40) during start-up of said furnace thereby  
determining expansion behaviour of said refractory lining portion (16) below  
said tuyere assembly (12).

7. The method as claimed in any one of the preceding claims, further comprising:  
providing a temperature sensor (90) and monitoring temperature within said clearance (40) between said tuyere assembly (12) and said refractory lining portion (16) to detect possible hot gas leakage.
8. The method as claimed in any one of the preceding claims, wherein said displacement sensor (50) is a linear electromechanical displacement sensor.
9. The method as claimed in claim 8, wherein  
said displacement sensor (50) includes a sensor body (52) mounted in a mounting hole (54) of a tuyere cooler (22) and a measuring pin (58) slidably supported by said sensor body (52), said pin (58) having a tip (62) that is in contact with an upper surface (38) of said refractory lining portion (16) or said removable refractory layer (72,74; 72').
10. The method as claimed in claim 9, wherein  
said tip (62) of said pin (58) consists of ceramic, cermet or refractory steel material.
11. The method according to claim 1, wherein said furnace is a shaft furnace, in particular a blast furnace.